SETH
STRUCTURAL
ENGINEERING

Structural Review of the Existing Building at
in Pennsylvania

Prepared for:

Summary

Seth Structural Engineering performed a structural assessment of the existing building at
Pennsylvania. The assessment included visual observation of the existing structural conditions and calculations on the existing floor allowable capacity. Visual observation was limited to what could be viewed at the time of the visit. Some areas were not accessible due to finishes. The house is a two-story structure with an original house and an addition to the east. The main building is approximately 31 feet long by 31 feet wide and the addition is 20 feet by 28 feet.

The building is framed with mostly true size wood framing which is expected given the age of the structure. The girders and columns are rectangular rough-cut timber. The main building roof is a hip style roof with a center vertical extension. The addition is also a hip style roof with rafters and hip beams. The main building second floor consists of 2 ½"x10" floor joists spanning east to west supported at the center by a timber girder. The first floor consists of 3"x10" and 2"x12" joists spanning north to south supported at the center by a timber girder and support posts. The perimeter foundation wall is mostly original stone construction except for the south and west walls where 8" masonry has been installed.

The Pennsylvania Residential Code 2018 and other reference standards were utilized for this assessment. Calculations are not included in this assessment.

Structural Review with Photographs

Addition: Roof Framing

- The 3"x5" roof joists are spaced at 27" are undersized for the loading, span, and spacing.
- The 2"x9 ¼" hip beam is undersized for span and loading.
    - Posts have been added near the center of the hip beam span. The posts are supported by the ceiling girder below. The ceiling girder size could not be verified.

Recommendation:

- Replacement of the roof framing is required given the inadequate sizing and connections. Reinforcement is not likely to be cost efficient.

Addition: Roof Framing

- The hip beam connection is not adequate as no ridge board is present.
- A ridge board is not present between the rafters to provide an adequate connection.
- Vertical deflection was observed from the outside adjacent to the main area.

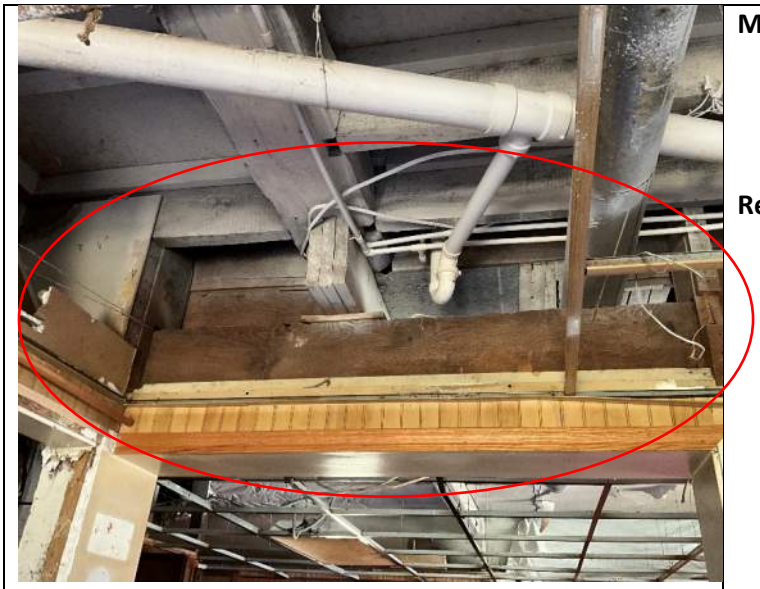
Recommendation:

- Replacement of the roof framing is required given the inadequate sizing and connections. Reinforcement is not likely to be cost efficient.

	**Addition: Roof Framing** • The rafters do not have adequate bearing at the wall top plate. Cracking and splitting are present in over half the rafters. • The hip beam (not shown) also has inadequate bearing and is split at mid depth. • **Recommendation:** • Replacement of the roof framing is required given the inadequate sizing and connections. Reinforcement is not likely to be cost efficient.
	**Main Area: Roof Framing** • The 3”x5” roof joists are spaced at 27” are undersized for the loading, span, and spacing. • **Recommendation:** • Replacement of the roof framing is required given the inadequate sizing and connections. Reinforcement is not likely to be cost efficient.

	**Main Area: Roof Framing** • The hip beam connection does not appear to be adequate. **Recommendation:** • Replacement of the roof framing is required given the inadequate sizing and connections. Reinforcement is not likely to be cost efficient.
	**Main Area: Roof Framing** • The center framing appears to be 2x4 rafters at more than 24” spacing. • A ridge board is not present. **Recommendation:** • Replacement of the roof framing is required given the inadequate sizing and connections. Reinforcement is not likely to be cost efficient.

	**Main Area: Second Floor Framing** • The joist size and spacing is adequate for the loading and span. • The joists appear to have pulled away from the north timber girder resulting in a loss of bearing. • Cracking/splitting was observed in the joists due to the notches present at the girder bearing. **Recommendation:** • Install joist hangers or; • Install new engineered lumber girders on each side of the existing timber girder.
	**Main Area: Second Floor Framing** • The north timber girder is supported on a wood header over the entry door. The header does not appear to be adequately sized per current code. **Recommendation:** • Install an engineered header on adequate supports to the foundation wall.



Main Area: Second Floor Framing

- The timber girders are supported on a wood header over an opening. The header (double 2x8) is not adequately sized per current code.

Recommendation:

- Install an engineered header on adequate supports to first floor. The supports will need to extend to the foundation level.

Main Area: Second Floor Framing

- The south timber girder has been previously reinforced with a 3 ply, 2x10 girder.

Recommendation:

- The 3-ply girder shall be replaced with an engineered girder.

	**Main Area: Second Floor Framing** • An inadequate header was installed on the southwest area. The main joists were cut and a single, 2x header was installed and toenailed into the adjacent joists. **Recommendation:** • The header shall be replaced with a 2-ply header. Additional sister joists will be required at the header ends.
	**Main Area: Second Floor Framing** • A bearing stud is missing from the wall framing. **Recommendation:** • Install a new 2x stud under the joist.

	**Addition: Second Floor Framing** • No access was available to determine the girder size supporting the roof posts above. • No access to the crawlspace below. **Recommendation:** • No additional work required.
	**Main Area: First Floor Framing** • The 2x12 joists are supported at the center bearing with a ledger strip nailed to the girder. • A newer 2x12 girder was installed adjacent to the existing timber girder. **Recommendation:** • Joist hangers shall be installed to replace the ledger strip. Cracking in the joist may still occur through use. ○ Alternatively, bearing support (beam/posts or wall) can be installed under the joists.

	**Main Area: First Floor Framing** • A joist under the stair landing has no bearing due to a notch in the joist and deterioration of the girder. **Recommendation:** • Provide a post support under the joist.
	**Main Area: First Floor Framing** • The south bearing condition is not typical. It appears a newer 2x12 girder was installed and nailed to the existing foundation wall. The girder is not supported by any post system. • The joists are supported by a ledger strip. **Recommendation:** • Bearing support (beam/posts or wall) shall be installed under the joists.

Main Area: First Floor Framing

- In the north area, approximately six joists have deteriorated from moisture and/or pest damage.
- A few of the joists have had additional 2x framing installed adjacent.

Recommendation:

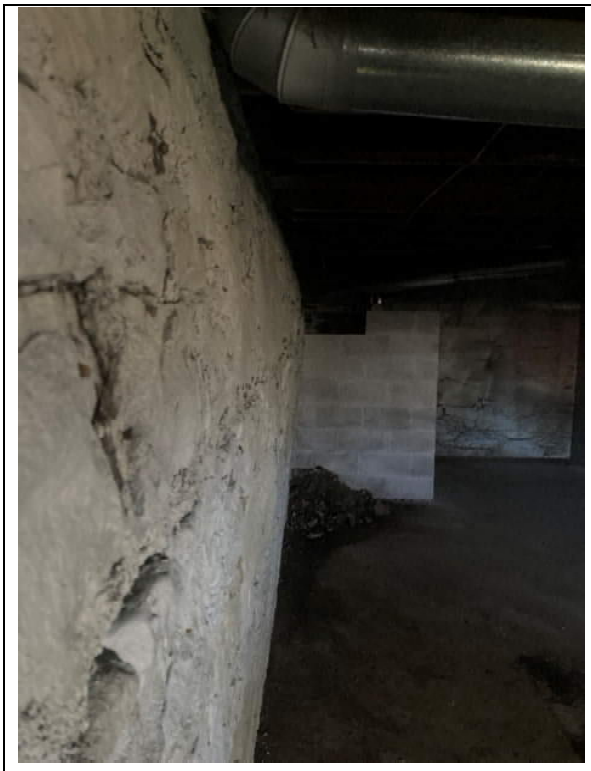
- 2x12 joists shall be installed adjacent to the deteriorated beams.
    - The joists shall be installed with joist hangers.

Main Area: First Floor Framing

- The center girder has various supports including jack posts, round timber, and rectangular timber.
- The timber shows signs of moisture deterioration.
- The jack posts are rusted and less than the maximum design capacity.
- The center timber girder shows signs of moisture deterioration.

Recommendation:

- New foundations and new jack posts will be required. The posts will be spaced closer than currently installed based on engineering calculations.
    - Alternatively, a full-length bearing wall with concrete wall footing could be installed.



Main Area: Foundation Wall

- The north stone foundation is bowed approximately 6” near mid-height.
- The mortar joining the stone has deteriorated.
- The northwest and south west corners are not sealed and open to the exterior.

Recommendation:

- The foundation wall requires replacement like the west and south walls.
- Any openings shall be sealed through repointing.

Thank you for the opportunity to work on this project. If you have any questions or concerns do not hesitate to contact Seth Structural Engineering.

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